

## **SNAP LATCH DRUM RELEASE FOR A DRAIN CLEANING MACHINE**

### **BACKGROUND OF THE INVENTION**

- [1] The present invention relates to a drain cleaning machine, and more particularly to a release assembly for removing the rotatable drum from the machine without tools.
- [2] Conventional drum type drain cleaning machines typically include a frame structure supporting a rotatable snake drum and a drive motor arrangement for rotating the drum. The frame structure also supports a snake feeding arrangement by which the snake or cable is axially displaced relative to the rotating drum during use of the machine. The snake coiled within the rotatable drum is displaced by the feeding arrangement and inserted into a pipe or drain to be cleaned. Rotation of the drum rotates the snake to achieve such cleaning.
- [3] The rotatable drum in known drain cleaning machines may typically be removed from the support frame and drive arrangement to facilitate replacement of the drum with one containing a snake having a different diameter and to make the separate components more mobile. Disadvantageously, conventional removable drums require tools to disassemble the rotatable drum from the support frame. This, of course, requires access to the proper tools and is also somewhat time consuming for the operator. Other known disassembly arrangements require a groove cut in a shaft which mounts the rotatable drum. The groove is located between the rotatable drum and the support frame to receive a spring loaded pin which rides within the groove. The pin is retracted to disassemble the rotatable drum from the support frame. By its location, the groove reduces the strength of the shaft in a weight bearing segment. Friction between the groove and the single pin may also eventually require the repair or replacement of the disassembly arrangement. Further, the pin must be manually retracted to both install and remove the rotatable drum.
- [4] Accordingly, it is desirable to provide a rotatable drum release assembly which provides an effective release without the necessity of tools and which locates shaft grooves in a position to minimize their load bearing effect on the shaft. It is further desirable to provide

a rotatable drum release assembly that need not be manually actuated to assemble the rotatable drum to the support frame.

### SUMMARY OF THE INVENTION

- [5] The drum release assembly according to the present invention provides a latch which engages an inner diameter of a plate spaced away from a rotary drum to lock and unlock the rotary drum to a drain cleaning machine. The drum shaft extends from a sleeve in a cantilevered manner and as the latch engages the plate, no shaft grooves are located in the shaft. Localized weakening of the shaft is thereby prevented.
- [6] Each latch is telescopically mounted within a latch sleeve which forms a substantially T-shaped arrangement with the shaft sleeve. Biasing members within each latch sleeve bias a latch outward. The latch sleeves extend for a linear distance less than the diameter of the inner opening of plate while the latches extend from the latch sleeves a total linear distance just greater than the diameter of the inner opening.
- [7] To mount the drum, the drum shaft is pushed into the sleeve. Contact between a wedge shaped face of the latch and inner opening of the plate forces the latches to be retracted into the latch sleeves. Once the inner opening of the plate passes the latches, the biasing members drive the latches outward. The drum is thereby rotatably locked in place by the interaction between the extended latches and the inner opening of the plate.
- [8] Lifting an actuating handle engages cam surfaces with the latches to simultaneously retract the latches into the latch sleeves. Once the latches are linearly retracted to a distance less than the inner opening of the plate, the drum is released.
- [9] The present invention therefore provides a rotatable drum release assembly which provides an effective release without the necessity of tools and which eliminates shaft grooves. The present invention further provides a rotatable drum release assembly that need not be manually actuated to assemble the rotatable drum to the support frame.

**BRIEF DESCRIPTION OF THE DRAWINGS**

- [10] The various features and advantages of this invention will become apparent to those skilled in the art from the following detailed description of the currently preferred embodiment. The drawings that accompany the detailed description can be briefly described as follows:
- [11] Figure 1 is a general perspective view of a drain cleaning machine having a removable rotatable drum according to the present invention;
- [12] Figure 2 is a rear perspective view of a removable rotatable drum;
- [13] Figure 3 is a front perspective view of a drain cleaning machine having a snap latch drum release assembly;
- [14] Figure 4 is an expanded view of a release handle as illustrated in figure 3; and
- [15] Figure 5A is a partially phantom view of the snap latch drum release assembly in a locked position; and
- [16] Figure 5B is a partially phantom view of the snap latch drum release assembly in an unlocked position.

**DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

- [17] Figure 1 illustrates a general perspective view of a portable drain cleaning machine 10 including a wheeled support frame assembly 12 which supports a rotatable snake drum 14, a drum drive assembly 16, and a snake feeding mechanism 18. Support frame assembly 12 is provided with at least one pair of wheels 20 such that the machine 10 is supported for rolling movement from one location to another.
- [18] The drum drive assembly 16 preferably includes an electric motor 22 which drives a drive belt 24. A removable cover 26 provides protection for the engagement between the belt 24 and motor 22. The motor 22 is mounted upon a biasing arrangement 28 which minimizes slack in the drive belt 24 and compensates for components which may be out of alignment while allowing removal of the belt 24.

- [19] The drum 14 contains a flexible plumbers snake 30 which extends outwardly through the feed assembly 18. The feed assembly 18 displaces the snake 30 inwardly and outwardly relative to the drum 14 during operation of the machine 10. The drive belt 24 extends from the motor 22 and about the perimeter of the drum 14. It should be understood that although the belt is illustrated about the perimeter of the drum in the disclosed embodiment, other drive arrangements will also benefit from the present invention. Rotation of the drive belt 24 rotates the drum 14 about an axis of rotation A.
- [20] Referring to Figure 2, a rear view of the drum 14 illustrates a drum shaft 32 extending therefrom. The drum shaft 32 is mounted to the drum 14 by at least one fastener 36 such as a set screw of the like which engages a flat on the shaft 32 (not shown.) The drum shaft 32 defines the axis of rotation A. The shaft includes a substantially rounded distal end 39. It should be understood that distal ends such as flat, rounded, pointed, tapered and the like will also benefit from the present invention. Preferably, the shaft includes no grooves or the like that may decrease the shaft strength. A smaller diameter and lighter shaft will thereby benefit from the present invention.
- [21] A plate 40 is coaxially attached to the drum 14 to extend about the shaft 32. Preferably, the plate 40 is a substantially annular disc having an inner opening 41 which revolves about the axis of rotation A. The plate 40 is affixed to the drum 14 by a multiple of fasteners 42 adjacent the plate 40 outer perimeter. The fasteners 42 are received in support ribs 45 of the drum 14 such that the inner opening, 41 is spaced away from the drum 14 and the shaft 32. It should be understood that although a separate annular disk is disclosed in the illustrated embodiment, other plates and integral portions of the drum will also benefit from the present invention.
- [22] Referring to Figure 3, the drum shaft 32 is rotatably and removably mounted in a sleeve 44 which is fixedly mounted to the support frame assembly 12. The sleeve 44 preferably contains one or more bushings or bearings 47 upon which the shaft 32 rotates. That is, the shaft 32 contacts the bearings and not the inner diameter of the sleeve 44. The

sleeve 44 is mounted through a cross brace assembly 46 of the frame assembly 12. The cross brace assembly 46 preferably forms a substantially rigid box arrangement in cooperation with the frame assembly 12.

[23] A snap latch drum release assembly 48 and actuating handle 50 are mounted to the sleeve 44. A first and second latch sleeve 52 extend from the sleeve 44 in a substantially perpendicular arrangement thereto. That is, the latch sleeves 52 and sleeve 44 form a T-shape. Each latch sleeve 52 movably supports a latch 54 which is telescopically mounted therein. The latches 54 are engageable with the inner opening 41 of the plate 40 as will be further described below.

[24] The release assembly 48 biases the movably latches 54 away from the sleeve 44. Preferably, a biasing member 56 such as a spring is located under compression between the sleeve 44 and the latch 54 to bias the respective latches 54 outward (as schematically illustrated by arrows L.) The latch sleeves 52 extend for a linear distance less than the diameter of the inner opening 41 of plate 40. The latches 54 extend from the latch sleeves 52 a linear distance just greater than the diameter of the inner opening 41 of plate 40. A guide pin 58 extends from each latch 54 and is movable within a slot 60 located through each latch sleeve 52. Interaction between the respective guide pin 58 and slot 60 limits the travel of the latch 54 within the latch sleeve 52. Stops 59 are preferably attached to each pin 58 to prevent axial movement thereof. That is, the handle 50 retains one axial end of the pin 58 while the stop 59 retains the opposite end. Other pins and retainers such as springs may also benefit from the present invention to limit axial travel. The slot 60 and pin 58 arrangement also provides an anti rotation feature for the latch 54 to assure that a wedge shaped 62 face of the latch 54 is consistently oriented away from the cross brace assembly 46.

[25] The pin 58 extends through the latch 54 and the latch sleeve 52 such that the pin 58 is also engageable with a cam surface 64 formed in the actuating handle 50. By pulling the actuating handle away from the sleeve 40 (schematically illustrated by arrow U – Figure 3),

the cam surfaces 64 drives the pins 58 and the attached latches 54 into the latch sleeve 52. That is, the latches 54 are telescopically retracted into the latch sleeves 52 (Figure 5B.)

[26] To mount the drum 14, the drum shaft 32 is pushed into the sleeve 44. As the shaft 32 is pushed into the sleeve 44, the latches 54 contact the inner opening 41 of plate 40. Contact between the wedge shaped 62 face of the latch 54 and inner opening 41, forces the latches 54 to be retracted into the latch sleeves 52 (Figure 5B.) The bias of each biasing member 56 is therefore overcome as the drum 14 is installed. Once the inner opening 41 of the plate 40 passes the latches 54, the latches are driven outward by the biasing members 56, i.e., telescoped outward from the sleeve 52. The drum 14 is thereby rotatably locked in place by the interaction between the extended latches 54 and the inner opening 41 of the plate 40 (Figure 5A.)

[27] Referring to Figure 5B, by lifting of the actuating handle 50 (illustrated schematically by arrow U,) the cam surfaces 64 retract the latches 54 into the latch sleeves 52. Once the latches 54 are linearly retracted to a distance less than the inner opening 41 of the plate 40, the drum 14 is released.

[28] The foregoing description is exemplary rather than defined by the limitations within. Many modifications and variations of the present invention are possible in light of the above teachings. The preferred embodiments of this invention have been disclosed, however, one of ordinary skill in the art would recognize that certain modifications would come within the scope of this invention. It is, therefore, to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described. For that reason the following claims should be studied to determine the true scope and content of this invention.